

# ADI Process Analyzers



Multi-purpose chemical analysis

# Typical applications

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Industry > Component	Chemical Industry	Metal Mining	Metal Surface	Semi Conductor	Food	Pulp, Paper, Textile	Power	Water
Acidity	•	•	•	•	•	•		•
Alkalinity	•							•
Aluminium		••	••					•
Ammonia	•••	•••		•••				••
Boric Acid	•		•	•			•	•
Bromide						•		
Bromine	••							
Cadmium	•	•	•					
Calcium	•••					•••		•••
Caustic	•		•	•				
Carbonate	•	•				•		•
Chlorate	•					•		
Chloride	••		••		••			
Chlorine	••							••
Chromium	••	••	••					••
Citric Acid					•			••
Cobalt	•	•						
COD	•					•		•
Copper	••	••	••	••				•
Cyanide	•••	••	•••					•••
Dithionite	•					•		
EDTA		•	•	•			•	
Fatty Acid					•			
Fluoride	••			••				•
Formaldehyde	•		•					
Glucose							•	
Hydrazine					•			
Hydrochloric Acid	•	•	•	•				
Hydrofluoric Acid			•	•				
Hypochlorite						••		•
Hypophosphite			•	•				
Iodide					•			
Iron	••	••	••					
Lactic Acid					•			•
Leuco Indigo						•		
Magnesium	••							••
Manganese								•
Mercaptans				•				
Nickel	••	••	••					•
Nitrate	••				••			••
Nitric Acid	•		•	•				
Nitrite	••				•			•
Nitrous Acid		•						
P & M								•
Permanganate	•							
Peroxide	•		•	•		•		
Persulphate	•							
Phenol	••							•
Phosphate	••				••			•
Phosphoric Acid	•		•	•				
Phoslic Acid	•							
Silica	•			•			•	•
Silver		•	•					
Sodium					•		•	•
Sulfide	•••					•••		••
Sulfite	•				•			
Sulfonic Acid	•		•					
Sulfuric Acid	•	•	•	•				
Surfactant	•		•					
Thiocyanate						•		
Titanium			••					
Urea	••							
Water	•				•			
Zinc	••	••	••					•

- Titration Technique (ADI 2016, ADI 2040, AD 2045TI)
- Ion Selective Electrode (ALERT, ADI 2018, ADI 2040, ADI 2045TI)
- Colorimetry Technique (ALERT, ADI 2019, ADI 2040, ADI 2045TI)

# Lab analysis on-line or at-line saves time and money

On-line and at-line Process Analyzers from Metrohm Applikon are the preferred solution for process monitoring in a wide range of industries. Using the complete range of modern ion analysis (titration, KF titration, photometry, ISE standard addition, voltammetry, and direct measurement), Metrohm Applikon Process Analyzers provide high precision results for any wet-chemical parameters you need right at your production line!

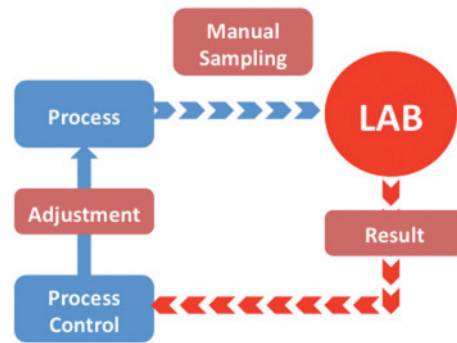
Metrohm Applikon has specialized in on-line and at-line process analysis for over 35 years. With this vast experi-

ence, we offer a wide range of analyzer products and integrated systems for diverse applications and industries to meet the challenging requirements and demands of your process.

Metrohm Applikon is part of the Metrohm Group and represented in over 35 countries. Our regional and local presence offers knowledgeable support in sales, applications, project engineering and start-up. We intend to be your process monitoring partner for years to come.

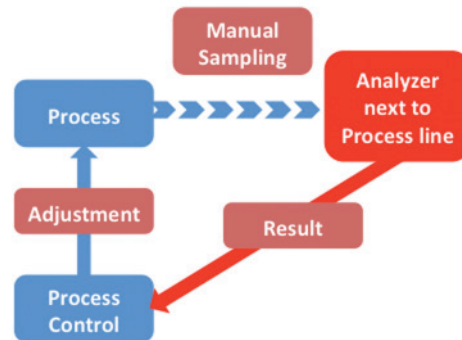
## Off-line lab analysis

- Manual sampling
- Sample transport to the lab
- Sample registration



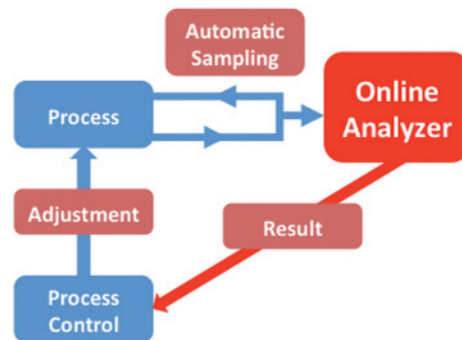
## At-line analysis

- Manual sampling
- Continuous manpower needed
- Automated lab analysis close to sampling point inside plant
- Ideal where multiple samples have to be taken at several sampling points along the process



## On-line analysis

- In-process measurement & response
- Automated sampling & registration
- Automated sample preconditioning
- Automated lab analysis
- Fast feedback of results
- Very limited manpower needed
- Close loop control



# Overview Metrohm Applikon Process Analyzers

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Whatever your project requirements and budget, Metrohm Applikon has the right analyzer and monitoring solution for you. From our low cost, single-stream-dedicated Alert

series to our multi stream, multipurpose ADI range we provide you with an innovative and customizable analyzer to cover all your process monitoring needs.

Features	Alert 2003	Alert 2004	ADI 2016	ADI 2018	ADI 2019	ADI 2045PL	ADI 2045TI	ADI 2045VA
<b>Number of sample streams</b>	1-2	1	1	1-2	1	multi	multi	1-4
<b>Ion selective electrodes</b>	yes	-	-	yes	-	yes	yes	-
<b>Colorimetry</b>	-	yes	-	-	yes	yes	yes	-
<b>Titration</b>	-	-	yes	-	-	yes	yes	-
<b>Karl Fischer titration</b>	-	-	yes	-	-	yes	yes	-
<b>Voltammetric analysis</b>	-	-	-	-	-	-	-	yes
<b>Modular configuration</b>	-	-	yes	yes	yes	yes	yes	yes
<b>Ex-proof zone I or II</b>	-	-	-	-	-	-	yes*	-

\* ADI 2040

## Alert Analyzer – «plug and analyze»

Metrohm Applikon offers two Alert models for a wide range of application for all kind of water chemistries.

- **Ion Selective** (Dynamic Standard Addition) for measurements in the ppm and higher range.
- **Colorimetry** (Differential Absorbance) for measurements in the ppb and ppm range.

### Ion Selective

- Ammonia
- Calcium
- Chloride
- Cyanide
- Fluoride
- Nitrate
- Potassium
- Sodium
- Sulfide

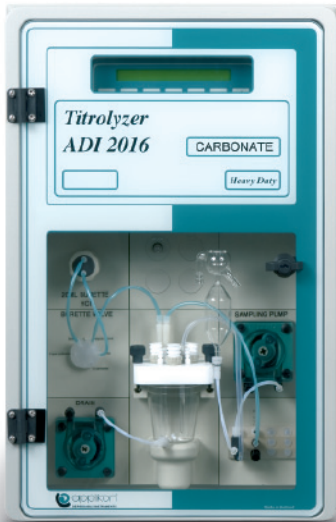


### Colorimetry

- Aluminium
- Ammonia
- Chromium
- Copper
- Cyanide
- Hydrazine
- Iron
- Manganese
- Nickel
- Nitrate
- Nitrite
- Phenol
- Phosphate
- Silica
- Zinc

## ADI 201Y Series – single method Process Analyzers

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### ADI 2016 Titrolyzer

- Performs «self-seeking» inflection point or «fixed end point» potentiometric titrations.
- Automatic result verification.



### ADI 2018 Ion Analyzer

- Performs dynamic standard addition method by means of a high precision burette and ion selective electrodes (ISE).
- Automatic calibration.



### ADI 2019 Colorimeter

- Performs differential photometric absorption measurements in the visible light range.
- Automatic calibration.

The ADI 201Y series is a robust and proven Process Analyzer that can be used for all types of liquid process samples. You can configure your own ADI 201Y depending on your application and process conditions.

### User friendly

- 2 line display
- Menu-driven function keys
- Measurement, calibration and cleaning cycles
- Freely programmable macros

### Reliable and accurate measurement

- Precision burette making highly accurate additions ( $\pm 0.01$  ml)
- Sample volume measured by calibrated pipette or loop
- Measurement accuracy  $<\pm 1\%$  FSR

### Meets IP 66

- Splash proof and watertight
- Separation of wet part analytical section and electronics compartment
- Corrosion proof option
- Stainless steel housing (page 9)

# Multifunctional Process Analyzers

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**Metrohm Applikon offers you three multifunctional Process Analyzers. The new ADI 2045TI, the ADI 2040 ex-proof, and the ADI 2045PL.**

The **ADI 2045 Process Analyzer** is the latest generation and industry leader of wet chemical analyzers on the market. The ADI 2045 uses high quality Metrohm analysis modules like the Titrando range of titrators.

Combining Metrohm's knowledge and experience in laboratory analysis and Applikon's experience in process control instrumentation results in an analyzer that can perform nearly every **on-line** or **at-line** analysis in the most difficult environments. The system's unique modular design makes it possible to adapt the analyzer to the specific needs of the application. Multi-parameter and multi-stream analyses are easily implemented as well as analog and digital communication with other devices.



ADI 2045TI

# ProcessLab ADI 2045PL – at-line routine analysis in production

The ProcessLab ADI 2045PL is by far the most robust routine system for at-line analysis in everyday use in the plant and control labs. Metrohm Applikon's 35 years experience with on-line analysis has resulted in a new system for custom made at-line process measurements. The

ProcessLab ADI 2045PL guarantees the highest level of reliable analytical results. The new ProcessLabManager software offers a user friendly interface in combination with the well proven **tiamo™** lab software.

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## Any doubts if on-line is the way to go?

### Start at-line and upgrade to on-line

The ADI 2045PL can be easily upgraded to an on-line Process Analyzer ADI 2045TI. Simply start with the ADI 2045PL at-line and upgrade to on-line to gain the maximum on savings with complete process automation.

Only software needs to be installed and a connection made to the Process and the on-line analyzer is ready to start. Downgrading to an at-line system is also possible.



# On-line Analyzer for trace metals and CVS

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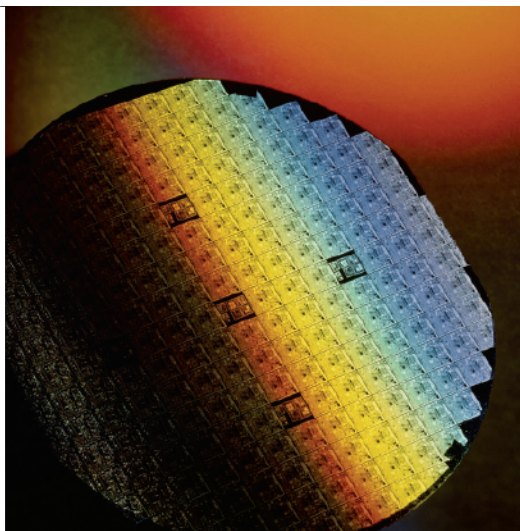
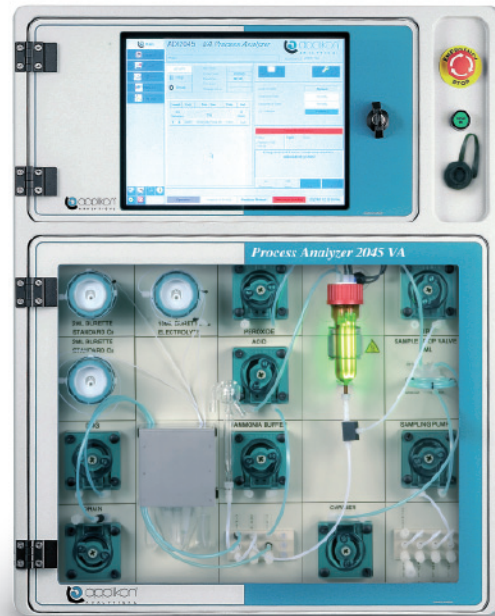
The ADI 2045VA is an on-line analyzer focusing on voltammetric analysis. Voltammetry is a technique that is mostly used for two important applications:

- **Stripping voltammetry** for the determination of trace metals
- **Cyclic Voltammetric Stripping (CVS)** for the determination of organic additives in electroplating baths (brighteners, levelers and suppressors)

Examples of typical applications Metals & Detection limits			
Antimony	200 ppt	Molybdenum	50 ppt
Bismuth	500 ppt	Nickel	50 ppt
Cadmium	50 ppt	Platinum	0.1 ppt
Chromium	25 ppt	Rhodium	0.1 ppt
Cobalt	50 ppt	Selenium	300 ppt
Copper	50 ppt	Thallium	50 ppt
Iron	50 ppt	Tungsten	200 ppt
Lead	50 ppt	Uranium	25 ppt
Mercury	100 ppt	Zinc	50 ppt

The ADI 2045VA is built in the same housing as the well known and proven ADI 2045TI multi-purpose analyzer. Its analytical heart is the 797 Computrace VA system from Metrohm, the most well known laboratory VA system. In the system either a so-called Multi-Mode Electrode (MME) or a Rotating-Disk Electrode (RDE) is used.

The advantage of this setup is that the same methods can be used as developed in the lab. In addition to the setup of the system in the lab the 2045VA is equipped with pumps, valves and optional pretreatment modules for a complete custom-made system.







## For clean, corrosive and hazardous environments ADI 2016 Titrolyzer and ADI 2040

The ADI 201Y is available with an easy-to-clean (C.I.P) stainless steel housing for the food & beverage industry. The stainless housing is also preferred in corrosive atmospheres.

The ADI 2040 explosion proof Process Analyzer complies with ATEX Zone I and Zone II electrical area classifications. The certified explosion proof version consists of a pressurized stainless steel cabinet together with intrinsic safety electronic devices. This ensures that the integrity of the ATEX certification is always met thereby allowing routine maintenance (wet part section only) to be conducted without the use of «hot work» permit.



ADI 2016KF Titrolyzer



ADI 2040 explosion proof Analyzer

## Preconditioning and integrated systems

Not only the chemical analysis, but also the sample preparation or preconditioning is of utmost importance for the success of an Metrohm Applikon Analyzer. Furthermore, the location of the analyzer contributes significantly to the quality of the analysis. The sample needs to be as representative as possible, which means that the sampling point needs to be as close to the analyzer as possible.

Metrohm Applikon can engineer and supply virtually any «unit operation» for sample preconditioning:

- Pressure reduction
- Cooling
- Heating, heat tracing
- (ultra) filtration
- Precipitation and settling
- Dilution to avoid crystallization
- Degassing
- Homogenizing
- Flow metering
- Phase separation

With more than 35 years of experience Metrohm Applikon can provide a complete and exact solution for almost any application. Projects range from one Analyzer in combination with simple sample preparation to complete turn-key packages with shelters, piping, wiring and interfacing. On-site, only the necessary utilities and the sample stream need to be connected, saving a lot of time and energy in the start-up phase of the instrument.



Analyzer shelter with integrated sample preconditioning system



Heavy duty sampling panel



Air pneumatic multi-stream panel



Liquid-to-gas sampling



Blow-back filter

# Ambient Air Monitoring – Aerosols and Gases Simultaneously

The MARGA (MOnitor for AeRosols and Gases in ambient Air) is an on-line ion chromatograph that measures the concentration of soluble inorganic species in aerosols and their related gas phase components in ambient air.

- Hourly simultaneously results for gases and aerosols
- Low detection limits
- Internal standard calibration
- High data quality
- Detailed system diagnostics



## Example of results measured in the Netherlands

Component	Detection Limit fixed loop ( $\mu\text{g}/\text{m}^3$ )	Detection Limit Preconc. ( $\mu\text{g}/\text{m}^3$ )
<b>Gas</b>		
HCl	0.01	0.001
HNO <sub>3</sub>	0.05	0.005
HNO <sub>2</sub>	0.02	0.002
SO <sub>2</sub>	0.03	0.003
NH <sub>3</sub>	0.05	0.005
<b>Aerosol</b>		
Cl <sup>-</sup>	0.01	0.001
NO <sub>3</sub> <sup>-</sup>	0.05	0.005
SO <sub>4</sub> <sup>2-</sup>	0.04	0.004
NH <sub>4</sub> <sup>+</sup>	0.05	0.005
Na <sup>+</sup>	0.05	0.005
K <sup>+</sup>	0.09	0.009
Mg <sup>2+</sup>	0.06	0.006
Ca <sup>2+</sup>	0.09	0.009

Download the EPA-MARGA reports and ETV verified results at

[www.metrohm-applikon.com/marga.html](http://www.metrohm-applikon.com/marga.html)

or



**Disclaimer:** The EPA Environmental Technology Verification Program (ETV) Name and/or Logo does not imply approval or certification of this product, nor does it make any explicit or implied warranties or guarantees as to product performance. Information on the performance characteristics of Metrohm Applikon ADI 2080 MARGA can be found at [www.epa.gov/etv](http://www.epa.gov/etv), or call Metrohm Applikon at +31 10 29 83 555 to obtain a copy of the ETV verification report.



[www.metrohm-applikon.com](http://www.metrohm-applikon.com)